Danish Energy Islands

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Danish Context

400 islands, 70 of which are inhabited
DK Island energy: ~40% heat, ~40% transport, ~20% electricity

1972: 92% of energy came from imported oil
1973: energy crisis
1979: energy crisis
1984: North Sea gas projects began
1997: Denmark was energy self-sufficient on oil and gas
2005: Oil and gas production peaked
2013: Denmark no longer energy self-sufficient

Danish Context Continued

Today: ~40% electricity from renewable energy

Growing GDP while reducing energy consumption

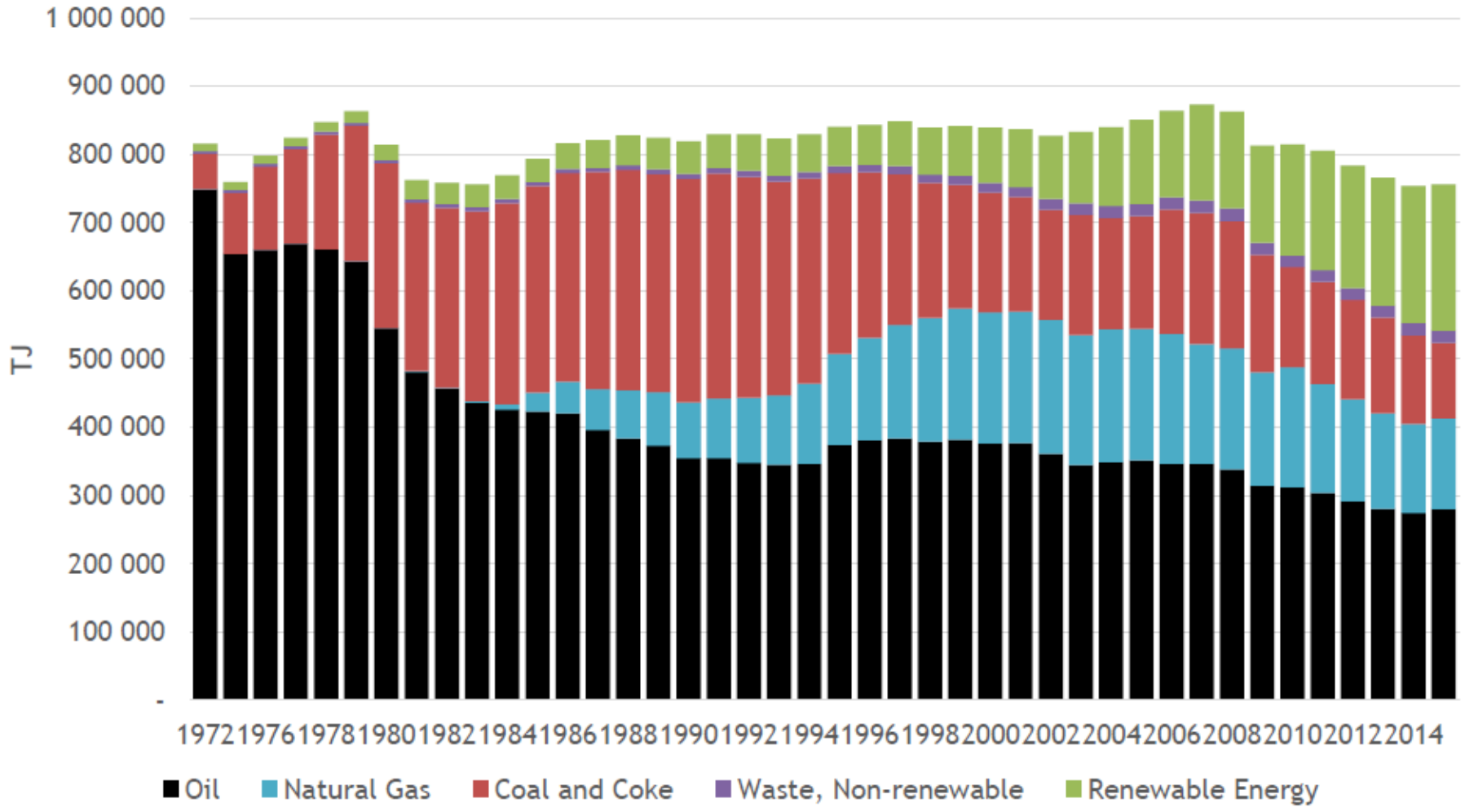
2035: Goal to have 100% fossil free electricity

2050: 100% fossil free in all sectors

Phase out of residential fuel oil heating

Current government has a more free-market approach and inconsistent support for sustainable energy

Denmark: Primary Energy Consumption



Case Studies

Samsø

Ærø

Orø

Samsø

Søren Hermansen
Director, Energy Academy, Samsø

Pop: 3724
Area: 112 km^2

1996: closing of slaughterhouse- largest private enterprise (100 jobs)

1997: declining population

1998: Put together a proposal to be the official *Danish Renewable Energy Island (REI)* – won

- Danish Government looking for a showcase community
  - (Show Kyoto goal of 21% reduction was possible)
- Government provided funds salary for Søren Hermansen (vegetable farmer) to come up with a 10-year plan

1999: Local engagement

- Door-to-door meetings, public hearings

2000: 11 x 1MW wind turbines

2002: 10 offshore turbines

2002-2005: 3 District heating plants (biomass) 70% demand

- Solar collectors, biomass burners for those not on district heating

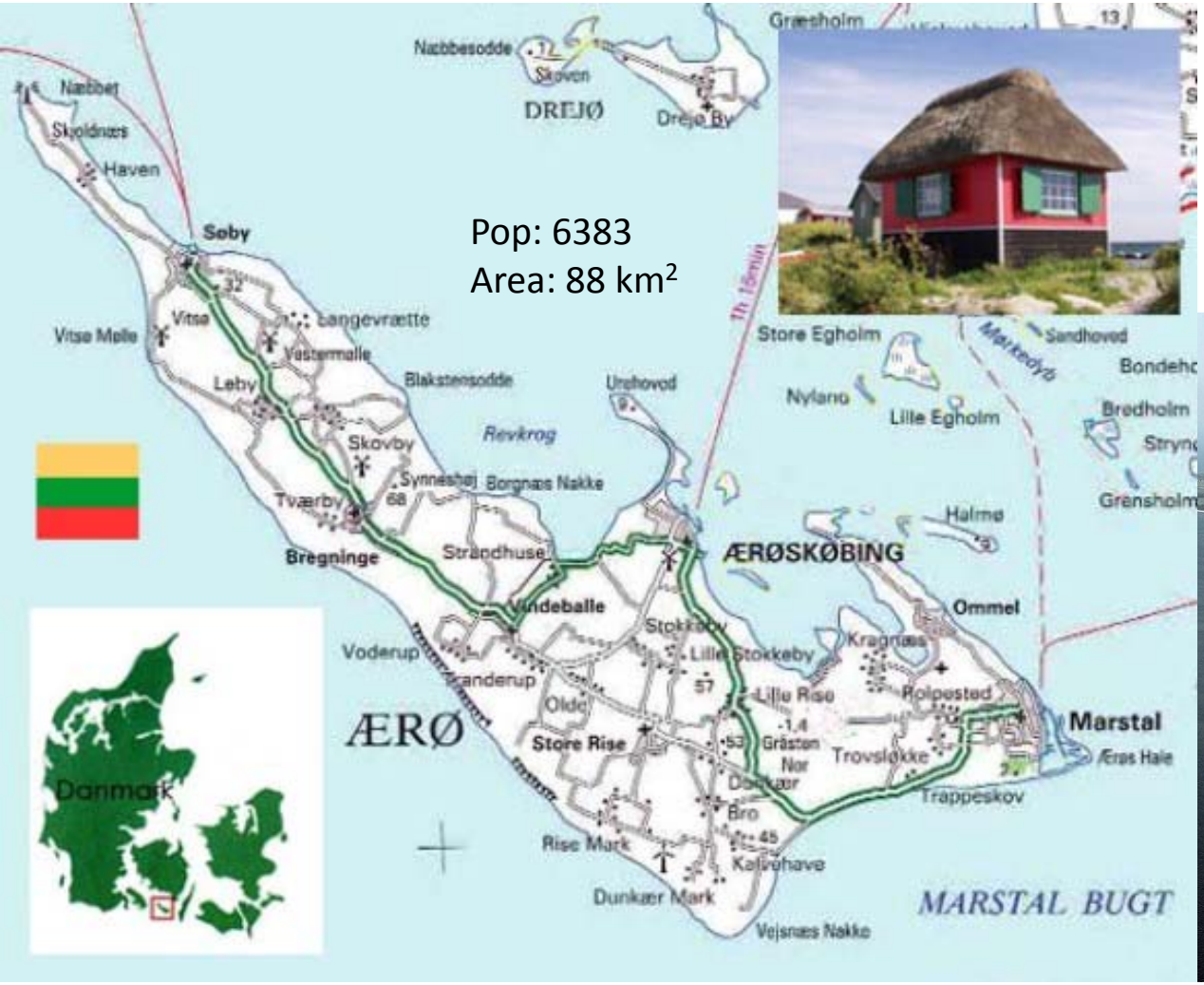
Promotion of Electric Cars

Samsø Energy Academy

Promotes strategies for RE, shares know-how

Works with other Danish islands and around the world

Ærø



Rune Schmidt
Manager and Energy Adviser
Ærø Energy and Environment Office

Late 1970s:

- Oil crisis, no natural gas connection, growing anti-nuclear sentiment
- Limited biomass resources

1981: Ærø Energy and Environment Office formed

- Public lectures in local high school
- Promote renewable energy and ecological living, no commercial interests
- Planned a wind energy park- Ærø municipality gave money to hire engineers

1985: Wind park: 11 turbines 55kW

- 128 people owned- into 11 subgroups, ÆE&E maintained

1989: Ærøskøbing Energy Plant

- Demonstration plant: Straw, solar heating , heat pumps, flue gas
- Bankrupt 1992 (cheap oil) – reformed as 100% renewable district heating

1990s: Solar PV push

- 2000: Became *Danish Solar City*

2002: 2MW of Wind installed, Solar district heating plant

Ærø Today

28,000 m2 solar panels (over 4m2/person)

12MW installed wind

- Produce 40GWh/year
- Consume 32GWh/year
- Export 8 GWh/year

3 RE District Heating (60% demand)

Electric Ferry Demonstration project

Goal to be 100% RE by 2035

(bigger challenge than Samsø)

(smaller island, more people)

Solar district heating plant

Orø

Pop: 846
(1200 summer houses)
Area: 14 km^2

Camilla Hay
Project Manager at Fors A/S

2015: Workshop on Bornholm about Orø, very successful

2015: Meeting with locals to make Orø a green demonstration island

- Coordination between Holbæk municipality, Fors A/S, Orø citizens
- Open forum- very ambitious (heat, water, sewage, removing oil boilers, heat pumps, ecological farming)

Main priority to replace fuel oil heaters

- Expensive- especially for pensioners
- Outside energy supplier working on a subscription business model for heat pumps

6 wind turbines(need to be replaced)- private company owns them

- some want them removed
- others want larger turbines

Rivalries and differences of opinion between north islanders and south islanders

- Some want green island, some want cheap heat
- Don’t like people from outside to tell them what to do
- Don’t like big companies- nervous about big investment into island

Orø Today

Cooperation broke down between main actors

- Municipality pulled out
- Key citizens moved away

Project is on hold

New strategy being explored

Other Case Studies

- Bornholm
- Læsø
- Fur

Strategies and Lessons Learned

Bottom-up

- Local education
- Avoid the “imposed solution”
- Citizens do not want to be Guinea Pigs – tech needs to work and be simple
- Give some structure as to goals and realistic possibilities
- Long-term vision, achieved through small steps (demo project, build support)
- Each scale has unique challenges

Partnership

- Local Community
- Research institutions
- Energy suppliers – business model that promotes local ownership and control
- Government

Strategies and Lessons Learned, continued

Local ownership

- Avoids NIMBY from private land owners
- Involve local people in managing and operating the energy plants
- Promote local RE start-ups “imported fuel creates no jobs”
- Export “know how”
- Need tariffs for small-scale investment
  - (large scale firm can undercut local ownership)

Identity

- Climate change and global sustainability messages DO NOT resonate
- Selling point- what does this mean for the island?
- Heal rivalries and rifts
- Government competitions and recognition
- Tourism

Thank you!
Tak!